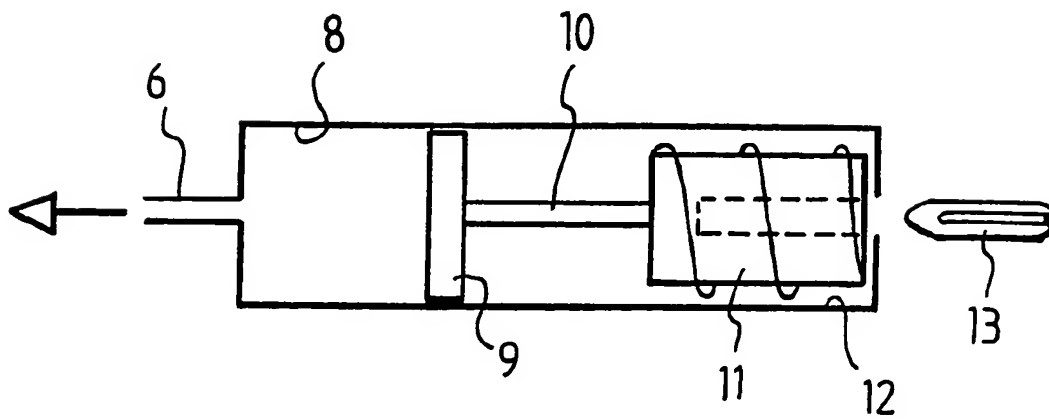
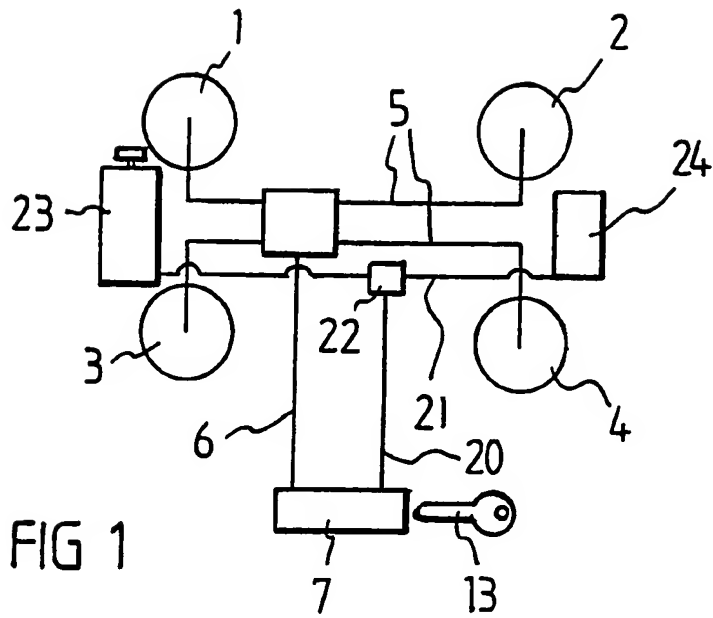


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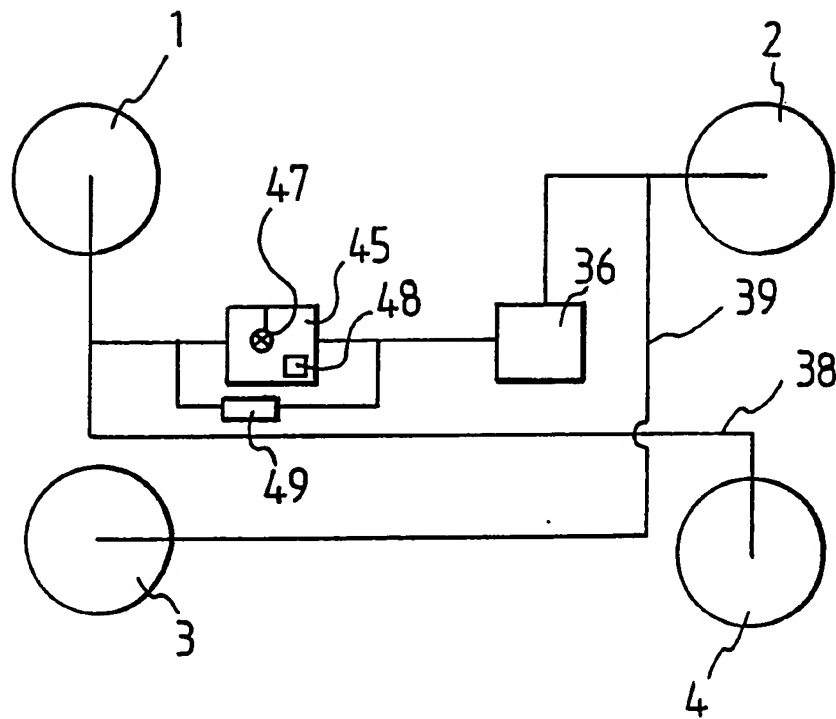


FIG 3

## **VEHICLE ANTI-THEFT SYSTEM**

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### **TECHNICAL FIELD OF THE INVENTION**

This invention relates to an anti-theft system for vehicles.

### **BACKGROUND**

Many systems have been proposed for protecting vehicles from theft, ranging from sophisticated electronic alarms to simple mechanical devices. In many cases however, a determined thief is still able to drive the vehicle away and then remove or disable the protection system at his leisure.

An aim of the present invention may be viewed as being to provide a system which prevents the vehicle from being driven in the first place.

### **SUMMARY OF THE INVENTION**

The present invention proposes an anti-theft system for a vehicle having braked wheels, in which the system enables the brakes to be applied continuously when the vehicle is unoccupied and is required to be released

by use of an appropriate key or by entry of a predetermined release code.

The brake pressure may be applied directly by means of a mechanical actuator, separate from the main actuator (master cylinder) by which the brakes are applied. The further actuator preferably acts via an hydraulic braking system. The actuator may include a plunger which is moved in a cylinder to apply hydraulic pressure to the brake cylinders of the relevant wheels.

The brakes may also be applied using a mechanical actuator in the form of a cutoff valve interposed in an hydraulic line between the main actuator (master cylinder) and the brake cylinders at the respective braked wheels. Thus, on application of pressure by the master cylinder the actuator can be operated to maintain brake pressure when the master cylinder is released.

The actuator may advantageously be mounted in the transmission tunnel of the vehicle by means of fastenings which are arranged to release the actuator allowing it to move into the tunnel when an undue force is applied.

The system is preferably also arranged to remove the fuel supply to the engine.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The following description and the accompanying drawings referred to therein are included by way of non-limiting example in order to illustrate how the invention may be put into practice. In the drawings:

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Figure 1 is a diagrammatic representation of a motor vehicle fitted with an anti-theft system of the invention,

Figure 2 is a detailed view of the actuator included in the system, in longitudinal section, and

Figure 3 is a diagrammatic representation of another motor vehicle fitted with a modified form of the anti-theft system.

#### DETAILED DESCRIPTION OF THE DRAWINGS

Referring firstly to Fig. 1, the four wheels 1-4 of a motor vehicle are provided with hydraulic brakes operated via hydraulic lines 5. An auxiliary line 6 is connected to the lines 5 at any suitable position, leading to an hydraulic actuator 7.

The actuator 7 is shown in more detail in Fig. 2 and includes an hydraulic cylinder 8 containing a plunger 9. The plunger is connected to a rod 10 which moves the plunger within the cylinder and is, in turn, moved by a screw 11 working in a screw-threaded housing 12. The screw 11 is adapted to receive a special key 13, allowing the screw to be rotated to drive the plunger along the cylinder 8 and increase the pressure of hydraulic brake fluid within the cylinder. This in turn causes the brakes to be applied to all four wheels and thus prevents the vehicle from being driven.

The key is taken away by the driver when the vehicle is unoccupied, but on his/her return the key can be re-inserted to rotate the screw 11 and thereby

withdraw the plunger relieving the brake pressure. The vehicle can then be driven as normal.

The actuator 7 can be mounted in any non-obvious position in the passenger compartment of the vehicle. In a preferred mounting position the actuator is fitted into the transmission tunnel of the vehicle by means of spring fastening clips (not shown) such that the actuator is normally accessible from the passenger compartment of the vehicle. The spring clips are sufficient to firmly hold the actuator under normal circumstances, but in the event of any tampering which results in unusual force on the actuator, the clips will release the actuator allowing it to move into the transmission tunnel where it is more inaccessible to the potential thief.

The illustrated system is also arranged to remove the fuel supply to the engine as an added safeguard. Rotation of the rod 10 tensions a cable 20 which, in turn, operates a cut-off valve 22 in the fuel supply line 21 to the engine 23. Reverse movement of the rod 10 releases the cut-off valve and restores the fuel supply from the fuel tank 24. The system could also be arranged to cut the fuel supply in other ways. For example, the cut-off valve 22 could be operated only if the brake pressure is relieved without normal operation of the actuator, e.g. by cutting the brake lines.

It will be appreciated that although a mechanical key can be used to operate the actuator, the actuator could be placed in an inaccessible position in the vehicle and operated remotely by an electrical switch which is operated by a key, by entry of a predetermined PIN number via a keypad or carried by a card in a magnetic strip, a bar code or punched holes for example.

Referring now to Fig. 3, the four wheels 1-4 of the vehicle are again provided with brakes operated from a pedal-operated dual 'master cylinder 36 via hydraulic lines 38 and 39 each arranged to feed a pair of wheels in a T configuration. As shown, each of the two lines operates on diagonally opposite wheels of the vehicle, although they could respectively operate on the front and back wheels.

A cutoff valve 45 is inserted in one of the lines 38 in the branch leading directly from one chamber of the master cylinder 36. The valve 45 is operable by a key 47 to cut off fluid communication between the master cylinder 36 and the braking cylinders of the supplied wheels 1 and 4. Operation of the valve 45 further operates a microswitch 48 which can in turn be used to operate or immobilise other systems within the vehicle such as a cutoff valve in the fuel supply line similar to the previously described embodiment. The microswitch could also operate to disable the ignition circuit of the vehicle.

To apply the security device on leaving the vehicle the brake pedal is depressed to operate the master cylinder 36 and apply the brakes and the key 47 is used to apply the cutoff valve 45. Thus, when the pressure is removed from the brake pedal the brakes remain applied at the wheels 1 and 4 preventing the vehicle from being driven. The key can be removed while the valve 45 is still applied.

In order to prevent damage to the seals of the wheel brake cylinders due to sustained high fluid pressure (e.g. 100 bar), a pressure-reducing valve 49 is connected in parallel with the cutoff valve 45. This valve 49 allows brake fluid to bypass the cutoff valve when the pressure differential exceeds a



predetermined figure (typically around 30 bar) but completely shuts off when the pressure falls below this figure. Thus, after brake pressure is applied and the cutoff valve operated, the pressure at wheels 1 and 4 will be reduced to a level which will not damage the seals but which is still sufficient to hold the brakes on.

On the drivers return the key can be used to de-operate the valve 45 so that all four wheels can be braked by the master cylinder as normal.

It is to be noted that should the valve 45 be unintentionally operated whilst the vehicle is being driven the vehicle can still be braked at the wheels 2 and 3 no brake pressure can be applied at the wheels 1 and 4 which are now isolated from the master cylinder with the brakes off.

The valve 45 can again be mounted in any non-obvious position in the passenger compartment of the vehicle as discussed above. Again, the valve 45 could be placed in an inaccessible position in the vehicle and operated remotely by an electrical switch which is operated by a key, by entry of a predetermined PIN number via a keypad or carried by a card in a magnetic strip, a bar code or punched holes for example. The switch may be used to supply electrical power to an electric motor which is mechanically linked to the valve 45 in any suitable manner in order to apply the valve.

The system could be applied to any vehicle having braked wheels such as a motorcycle or a caravan for example. In each case the system could be incorporated on manufacture of the vehicle or retro-fitted.

\* \* \* \* \*

## CLAIMS

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1. An anti-theft system for a vehicle having braked wheels, including means which can be operated to cause the brakes to be applied continuously when the vehicle is unoccupied, and which can only be released by use of an appropriate key or by entry of a predetermined release code.
2. An anti-theft system according to Claim 1, in which the brakes operate via an hydraulic braking system.
3. An anti-theft system according to Claim 2, in which the hydraulic braking system includes a master cylinder arranged to operate brake cylinders at the braked wheels.
4. An anti-theft system according to Claim 3, in which said means comprises a mechanical actuator which is separate from the master cylinder.
5. An anti-theft system according to Claim 4, in which the mechanical actuator includes a plunger which is moved in a cylinder to apply hydraulic pressure to the brake cylinders.
6. An anti-theft system according to Claim 4, in which the mechanical actuator comprises a cutoff valve interposed in an hydraulic line between the master cylinder and the brake cylinders at the respective braked wheels such that on application of brake pressure by the master cylinder the

actuator can be operated to maintain brake pressure when the master cylinder is released.

7. An anti-theft system according to Claim 6, in which additional braked wheels supplied from the master cylinder are not isolated by the cutoff valve.

8. An anti-theft system according to Claim 6 or 7, in which the cutoff valve isolates diagonally opposed braked wheels.

9. An anti-theft system according to Claim 6, 7 or 8, in which a pressure-reducing valve is connected across the cutoff valve to limit the continuous pressure applied to the wheel cylinders.

10. An anti-theft system according to any preceding claim, which is also arranged to remove the fuel supply to the engine.

11. An anti-theft system according to any preceding claim, in which the mechanical actuator operates an electrical switch when operated to isolate the wheel cylinders.

12. An anti-theft system according to Claim 11, in which the electrical switch is arranged to actuate a cutoff valve in a fuel supply line of the vehicle.

13. An anti-theft system according to Claim 11 or 12, in which the electrical switch is arranged to disable an ignition system of the vehicle.

14. An anti-theft system according to any preceding claim, in which the actuator is mounted in a transmission tunnel of the vehicle by means of fastenings which are arranged to release the actuator allowing it to move into the tunnel when an undue force is applied to the actuator.

15. A vehicle anti-theft system substantially as described with reference to Figures 1 and 2 of the drawings.

16. A vehicle anti-theft system substantially as described with reference to Figure 3 of the drawings.

\* \* \* \* \*

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**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

Application number  
GB 9420628.1

**Relevant Technical Fields**

- (i) UK Cl (Ed.N) F2F (FBH, FHD)  
(ii) Int Cl (Ed.6) B60R 25/08

Search Examiner  
PETER SQUIRE

Date of completion of Search  
13 APRIL 1995

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
1-16

(ii) ONLINE: EDOC, WPI

**Categories of documents**

- |   |   |
|---|---|
| <b>X:</b> Document indicating lack of novelty or of inventive step.   | <b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.        |
| <b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category. | <b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application. |
| <b>A:</b> Document indicating technological background and/or state of the art.   | <b>&amp;:</b> Member of the same patent family; corresponding document.   |

Category	Identity of document and relevant passages		Relevant to claim(s)
E, X	GB 2280242 A	(REDFERN) 25 January 1995 see eg page 10 lines 1-11	1-4,6,9
X	GB 2266566 A	(BAMBOROUGH) see page 11 lines 16-23 and page 12 lines 22-30	1-5
X	GB 2205076 A	(CONWAY) see page 7 line 11 - page 9 line 8	1-3,6,11,13
X	EP 0526273 A1	(BENDIX) see column 2 line 30 - column 3 line 4	1-5
X	WO 91/06448 A1	(PHILLIPS) see page 5 line 26 - page 6 line 21	1-4,6
X	US 4451776	(JETER) see eg column 6 lines 1-44	1-4,6
X	US 4934492	(HAYES-SHEEN) see column 4 line 63 - column 5 line 7 and column 6 lines 40-68	1-5,11,13
X	US 4834207	(HAVENHILL ET AL) see eg column 3 lines 49-68	1-4,6,10-13
X	US 4721192	(CANO) see eg Figures 1-3	1-4,6-8
X	US 4018314	(RICHMOND ET AL) see eg column 6 lines 1-14	1-4,6,9
X	US 3910372	(MOZZAR) see eg column 2 lines 41-46	1-4,6,10-13

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

DERWENT-ACC-NO: 1995-265483

DERWENT-WEEK: 199805

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TITLE: Motor vehicle anti-theft system - comprises device which can be operated to cause brakes to be applied continuously when vehicle is unoccupied, and which can only be released by use of appropriate key or by entry of predetermined release code

INVENTOR: SMITH, J B

PATENT-ASSIGNEE: SMITH J B[SMITI]

PRIORITY-DATA: 1994GB-0007550 (April 15, 1994) , 1994GB-0002342 (February 8, 1994)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
GB 2286232 A	August 9, 1995	N/A	013	B60R 025/08
GB 2286232 B	January 14, 1998	N/A	000	B60R 025/08

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
GB 2286232A	N/A	1994GB-0020628	October 13, 1994
GB 2286232B	N/A	1994GB-0020628	October 13, 1994

INT-CL (IPC): B60R025/08

ABSTRACTED-PUB-NO: GB 2286232A

BASIC-ABSTRACT:

The vehicle anti-theft system comprises an actuator which comprises a cut-off valve (45) inserted in the hydraulic supply line to two diagonally opposite wheels (1 and 4). After master cylinder (36) operation those wheels can be isolated with the brakes applied to prevent theft whilst the vehicle is unattended. A pressure-relief valve (49) reduces the pressure at the wheels so as to prevent the wheel cylinder seals being damaged. A microswitch (48)

operated together with the valve (45) cuts off the fuel supply and disables the ignition circuit.

Preferably, parking brake pressure is applied by an actuator having a plunger moving in a cylinder (7). Operation of the plunger may simultaneously actuate the fuel cut-off valve (22). The actuator is operated by a key (47,13) or by entry of a predetermined number via a keypad or a card, and may be mounted in the vehicle transmission tunnel by fastenings arranged to release the actuator into the tunnel in the event of tampering.

USE/ADVANTAGE - For vehicle having braked wheels such as motorcycle or caravan. Can be retro-fitted or fitted during vehicle mfr.

ABSTRACTED-PUB-NO: GB 2286232B

EQUIVALENT-ABSTRACTS:

The vehicle anti-theft system comprises an actuator which comprises a cut-off valve (45) inserted in the hydraulic supply line to two diagonally opposite wheels (1 and 4). After master cylinder (36) operation those wheels can be isolated with the brakes applied to prevent theft whilst the vehicle is unattended. A pressure-relief valve (49) reduces the pressure at the wheels so as to prevent the wheel cylinder seals being damaged. A microswitch (48) operated together with the valve (45) cuts off the fuel supply and disables the ignition circuit.

Preferably, parking brake pressure is applied by an actuator having a plunger moving in a cylinder (7). Operation of the plunger may simultaneously actuate the fuel cut-off valve (22). The actuator is operated by a key (47,13) or by entry of a predetermined number via a keypad or a card, and may be mounted in the vehicle transmission tunnel by fastenings arranged to release the actuator into the tunnel in the event of tampering.

USE/ADVANTAGE - For vehicle having braked wheels such as motorcycle or caravan. Can be retro-fitted or fitted during vehicle mfr.

CHOSEN-DRAWING: Dwg.1,3/3 Dwg.1

TITLE-TERMS: MOTOR VEHICLE ANTI THEFT SYSTEM COMPRISE DEVICE CAN OPERATE  
CAUSE

BRAKE APPLY CONTINUOUS VEHICLE UNOCCUPIED CAN RELEASE APPROPRIATE  
KEY ENTER PREDETERMINED RELEASE CODE

ADDL-INDEXING-TERMS:

MOTORCYCLE CARAVAN

DERWENT-CLASS: Q17 X22

EPI-CODES: X22-A08; X22-C; X22-X03;

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: N1995-204299